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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

This is a U.S. Patent Application for:

Title: FOLDING, DISPOSABLE TOOTHBRUSH

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Folding, Disposable Toothbrush

Field of the Invention

[0001] The field of the invention is dental hygiene products.

Background of the Invention

[0002] Maintaining proper dental hygiene is a key to good health. In particular, regular removal of dental plaque from the teeth by brushing and flossing can prevent gingivitis and periodontal disease. Gingivitis and periodontal disease can cause tooth loss and have even been associated with heart disease. To combat these diseases, many dentists recommend brushing the teeth three times a day and flossing at least once a day.

[0003] Most people know the importance of good dental hygiene, but putting it into practice can be difficult. Many people would have to carry around dental hygiene equipment in order to brush and floss according to the recommended schedule. Toothbrushes, toothpaste, and floss can be awkward and inconvenient to carry for use outside the home.

[0004] To address these problems, some manufacturers have created small toothbrushes that can be easily carried in a purse or pocket. However, a small toothbrush often does not provide sufficient leverage for adequate cleaning and can be awkward to use.

[0005] Others have created folding toothbrushes. For example, U.S. Patent Nos. 4,467,822 to Blackwell, “Toothbrush” (1984); 4,850,074 to Klevan, “Folding Toothbrush” (1989); 4,979,258 to Buj, “Children’s Folding Toothbrush” (1990); 5,464,294 to Chee *et al.*, “Folding Toothbrush” (1995); 5,476,334 to Tello-Vallarino, “Foldable Toothbrush with Toothpaste” (1995); and 6,650,810 B1 to Jacobson, “Collapsible Toothbrush” (2003) are all concerned with toothbrushes that fold up along an arc parallel to the plane that includes the longitudinal axis of the bristles.

[0006] However, when the hand grips a toothbrush that folds in an arc in the plane parallel to the bristles, it may not provide enough rigidity to prevent the toothbrush from folding inadvertently during use. To keep the toothbrush rigid, support must be applied behind the joint in the toothbrush. Typically, this support is the curved palm of the hand if the toothbrush folds inwards, and the curled fingertips if the toothbrush folds outwards. Because of the curvature of the palm and fingers when the palm grips a toothbrush handle, this support can be problematic. If the toothbrush cannot be used without risk of buckling, the user may be unable to brush her teeth with the force needed to remove plaque.

[0007] Typically, a toothbrush is grasped in what is known by ergonomists as a modified power grip. In an “unmodified” power grip, the fingers wrap around a handle with the thumb overlapping the fingers. In a modified power grip as used with a toothbrush, the fingers wrap partially or wholly around the toothbrush handle with the thumb out straight along the handle. The handle is thick enough to separate the fingertips

from the palm. (The grip is also known technically as a “power grip with a precision component”.)

[0008] In the modified power grip, the forearm muscles have shortened partially through their available range of contraction and are at their most efficient because of the mechanics of the line of pull. In holding a toothbrush firmly in this kind of grip, movements are carried out by the powerful muscles of the forearm, upper arm and shoulder, and not by the fine and delicate muscles in the palm of the hand. The positions of the finger joints are fixed by the shape of the grip, which further fixes the small hand muscles. The powerful muscles also help stabilize the toothbrush, and reinforce the joint and thus provide stronger reinforcement. In contrast, a toothbrush that folds in the direction of the bristles (or 180° from it) is less stable because the weaker muscles of the hand and palm provide force opposing folding.

[0009] A locking mechanism can be applied to prevent the toothbrush from buckling. For example, see U.S. Patent No. 4,979,258 to Buj, “Children’s Folding Toothbrush” (1990). However, adding a locking mechanism increases manufacturing difficulty and adds to the expense of manufacture.

[0010] Still others have created telescoping toothbrushes. For example U.S. Patent Nos. 4,234,087 to Pandak, “Combination Toothbrush Carrier and Holder” (1980); 4,866,809 to Pelletier, “Collapsible Toothbrush Construction” (1989); 5,400,457 to Ridgley, “Collapsible Toothbrush” (1995); and 5,699,574 to Oviatt, “Extendible Applicator” (1997) all concern toothbrushes that telescope along an axis generally perpendicular to the longitudinal axis of the bristles.

[0011] However, if the toothbrush telescopes along the axis parallel to the longitudinal axis of the brush, the act of brushing – which moves the toothbrush in the direction of the telescoping -- may cause the toothbrush to collapse or telescope down during use.

[0012] Both folding and telescoping can possibly be avoided by gripping the toothbrush in a tight power grip or modified power grip. However, gripping the toothbrush with sufficient force can be fatiguing, and some users may be unable to do so due to disability. Again, a locking mechanism can be added, but such a mechanism complicates use and manufacture.

[0013] Another approach has been to produce a toothbrush in two pieces that can be temporarily joined to create a toothbrush of one length for use, and then taken apart for storage at a shorter length. For example, U.S. Patent No. 5,887,601 to King, “Toothbrush” (1999) takes this approach. However, having to assemble and disassemble a toothbrush before and after use can be bothersome, and a toothbrush in multiple pieces increases the possibility that parts may get lost and the toothbrush become unusable.

[0014] These previous approaches result in toothbrushes that, in addition to being cumbersome and difficult to use, require sufficient material and are sufficiently expensive to manufacture such that they are not practicably disposable for the average consumer. This in turn necessitates the additional development and manufacture of a storage system so that the toothbrush can be carried without becoming dirty or wetting the pocket or purse it is carried in.

[0015] What is needed is a compact, foldable toothbrush that fits easily into the hand and that can be supported by the hand in an ergonomically efficient way, and that can be manufactured efficiently so that the toothbrush can be priced low enough to be disposable.

Summary of the Invention

[0016] A compact, foldable toothbrush folds in the plane perpendicular to the axis of the toothbrush bristles, in a fanning-out motion of two arms. One arm includes toothbrush bristles, and the other extends the toothbrush handle. Toothpaste can be put on the bristles at the time of manufacture so that the user need not carry toothpaste to use the brush. The prepasted toothbrush can be easily carried in a pocket or purse, used once, and then thrown away.

[0017] The two arms of the toothbrush can be attached via a grommet. The grommet allows the two arms to rotate so that when open, the two arms form a toothbrush with a generally longitudinal body with bristles mounted generally perpendicular to the toothbrush body. When opened, the toothbrush can be held so that the extended thumb above and the fingers below support the joint, providing sufficient support for vigorous brushing. Because the hand provides much of the support, the bristles can be mounted on a very thin toothbrush body, thus using little material. The simplicity of design and ease of manufacture enable the toothbrush to be manufactured cheaply enough that it is economically feasible for the consumer to dispose of the toothbrush after a single use.

Brief Description of the Drawings

[0018] FIGURE 1A is a depiction of a toothbrush in accordance with the present invention showing the toothbrush in its fully opened position.

[0019] FIGURE 1B is a schematic drawing of the toothbrush of 1A in side view, showing the grommet extending through both arms of the toothbrush.

[0020] FIGURE 1C is a depiction of toothbrush in accordance with the present invention showing an alternative shape of the toothbrush.

[0021] FIGURE 2 shows the toothbrush of FIG. 1 in a half-opened position to show the action of folding.

[0022] FIGURE 3 shows the toothbrush of FIG. 1 in a fully folded position.

[0023] FIGURE 4A is a depiction of an alternative embodiment of the invention in which the toothbrush includes dental floss, a toothpick, and a tongue scraper.

[0024] FIGURE 4B shows an alternative configuration of the tongue scraper that allows the floss to be easily inserted into the mouth.

Detailed Description of the Preferred Embodiments

[0025] FIGURE 1A shows a toothbrush 100 in accordance with the present invention. Toothbrush 100 includes bristles 102 having an affixed end 104 and a free end 106 defining a longitudinal bristle axis. A bristle arm 108 is attached to a handle arm 110 by means of a grommet 112. The end of handle arm 110, extending under bristle arm 108, is schematically illustrated by a dashed line 114.

[0026] Grommet 112 is attached so as to allow rotation of bristle arm 108 and handle arm 110 around grommet 112 and in a plane generally perpendicular to the longitudinal bristle axis. In a first alternative, a brad, or in a second alternative, a rivet can be used to attach the arms. A side view showing grommet 112 extending through the

thicknesses of both arms is shown in FIG. 1B. Alternatively, another method of attachment that allows for rotational movement can be used.

[0027] Handle arm 108 and bristle arm 110 are preferably made from sheet plastic, preferably vinyl, in a thickness ranging from 0.01 inch to 0.8 inch. In a preferred embodiment, the arms are cut from vinyl 30 mils (0.03 inch) thick. Sheet plastic is readily obtainable and is used in applications including credit cards, calendar cards, membership cards, and placards. Because arms 108 and 110 can be cut from plastic sheets, manufacturing costs of injection molding or construction of the toothbrush body can be avoided. Manufacturing materials are thus readily available, and the toothbrush body can be made without expensive custom design and manufacture, thereby decreasing production cost. Furthermore, because the toothbrush is made from sheet plastic, companies, systems and means already exist that can cheaply and easily print advertising logos and artwork onto each toothbrush by offset printing including a four-color process. Accordingly, the toothbrush arms provide an easy, cheap and very effective means for advertising.

[0028] The toothbrush can be made from any of a wide range of plastics, including polyethylene, polycarbonate, plexiglass, lucite, acrylic, polypropylene, butyrate, lexan, nylon, and styrene.

[0029] In another embodiment, the toothbrush can be manufactured from bamboo. The bristle arms and the handle arms can be made from strips of bamboo in approximately the same dimensions as the plastic arms. In a preferred embodiment, the bamboo arms are in the range of 2 to 4 inches in length, 0.5 inch to one inch in width, and

between .05 and 0.5 inch thick. Preferably, the length of each arm is 3 inches and the overlap is 1.5 inches, so that the toothbrush is 4.5 inches in length when fully open. The bamboo arms can be attached by methods including grommets, brads, and rivets. Any method of attachment that allows for relative rotation of the two handles is compatible with the invention. In another alternative, each of the handle arm and bristle arm is made from a different material.

[0030] Other materials and thicknesses can be used so long as they support the fanning/rotation mechanism and so long as the toothbrush fits comfortably in the hand and mouth. In a preferred embodiment, each arm of the toothbrush is approximately 3 inches in length and the overlap is approximately 2 inches, so that when fully extended, the toothbrush is approximately 4 inches long. In a preferred embodiment, the toothbrush is approximately one inch wide, and each arm is 0.03 inches (30 mils) thick. The bristles are approximately 0.75 inch long.

[0031] The overlapped portion 116 of the toothbrush body adds stability to the toothbrush. The toothbrush can be comfortably held in the hand so that the thumb braces the hinge on one side of the toothbrush and the fingers brace the hinge on the other side of the toothbrush, allowing the user to apply sufficient pressure to clean tooth surfaces without causing the brush to buckle. Unlike toothbrushes that fold in an arc parallel to the longitudinal axis of the bristles, the novel design herein allows the user's hand to stabilize the brush.

[0032] In a preferred embodiment, the overlapped portion 116 is at least 1 inch to provide for sufficient stabilization of the toothbrush body joint during vigorous brushing.

However, the invention is compatible with a much smaller overlapped portion since the hand support alone provides adequate stability.

[0033] Tufts of bristles 102 are shown extending longitudinally from the toothbrush body. Bristles 102 are preferably nylon with rounded ends to avoid scratching the gums. The bristles can be attached to the bristle handle by any means that adequately secures them to the handle. They can be embedded in the plastic, sewn to the handle, glued in place, or, alternatively, can be stapled to the bristle arm. The bristles can be attached to a separate piece, forming a bristle element. The bristle element is glued to the bristle arm. Alternatively, the bristle element can be attached to the bristle arm by other means including stapling and sewing.

[0034] Other materials, such as polyester, can also be used for the bristles. Natural bristles can be used. Toothbrush bristles typically come in soft, medium, and hard, with soft or medium recommended for typical use. Bristles 102 can be alternatively soft, medium, or hard, or a combination. Furthermore, although the preferred embodiment uses bristles to clean, other dental cleaning and gum stimulation mechanisms are compatible with the invention. For example, a cleaning pad can be attached in place of bristles 102, or, alternatively, soft rubber or vinyl or silicone protrusions can be affixed.

[0035] In a preferred embodiment, bristles are in tufts in a roughly rectangular pattern of approximately 5 by 9 rows. Other configurations are within the scope of the invention. Fewer or more rows of bristle tufts or a nonrectangular arrangement (for example, elliptical or round) can be used. Furthermore, combinations of

soft/medium/hard bristles and combinations of bristles and cleaning pads or rubber, vinyl, or silicone protrusions can be used. The upper surface of the bristles (the surface formed by the free ends of the bristles) is depicted as generally planar; it can also be wavy or uneven.

[0036] In a preferred embodiment, toothpaste is applied to the toothbrush by the manufacturer so that the user purchases the toothbrush prepasted. In one embodiment, the toothbrush bristles are dipped in a liquid dentifrice, for example tooth powder in water, and allowed to dry. Thus, when the consumer purchases the brush, the dentifrice is already on the bristles and the consumer need not apply toothpaste to the brush.

[0037] Grommet 112 is preferably annular and made of brass. Grommet 112 extends through both upper bristle arm 108 and lower handle arm 110. In a preferred embodiment, grommet 112 attaches arms 108 and 120 tightly enough to allow rotation with a small motion, but does not so loosely attach the arms as to allow them to swing freely without being moved. Although the preferred embodiment features a grommet, other fastenings that attach the two arms but allow rotation, such as rivets, posts, and brads, can also be used. The fastening may be solid or may have a hollow core, *e.g.*, can be solid or, alternatively, cylindrical or annular. A locknut or a finishing washer can also be used to attach the arms.

[0038] The grommet or, alternatively, other means of attachment of the arms can be made of any material that allows the invention to operate as intended. The means of attachment can be made from another material, but preferably is water resistant as the toothbrush is designed to get wet.

[0039] Also in a preferred embodiment, the toothbrush is in the shape of a rectangle with rounded corners (so as not to poke or scratch the user) or an ellipse. Other shapes are within the scope of the invention, such as the generally oval shape depicted in FIG. 1C. Preferably, the toothbrush when fully open is between two inches and seven inches long. The specific dimensions of the toothbrush are not critical to the invention so long as they allow the practice of the invention.

[0040] FIGURE 2 shows the folding toothbrush of FIG. 1A in a partially folded position. Dashed line 202 indicates that the handle arm and the bristle arm both rotate 360° around grommet 112. In other embodiments, each of handle arm 110 and the bristle arm rotates at least 180° around grommet 112. The rotation is relative; it does not matter whether one or both arms rotate around the grommet so long as the relative rotation between the arms allows for the toothbrush to be opened. (For instance, the attachment means could be integrally formed in one of the arms.)

[0041] FIGURE 3 depicts the toothbrush of FIG. 1A in a fully folded position. Handle arm 110 is folded completely underneath bristle arm 108. When fully folded, the toothbrush is compact so as to fit easily into a pocket or purse. When prepared for storage in pocket or purse, a cover can be slipped over bristle portion 102. Preferably, the cover includes a waterproof material such as plastic, rubber, or silicone so that the toothbrush can be put back after use without getting the user's purse or pocket wet. In one embodiment, the cover is a soft pouch; in another, it has rigid sides. In one embodiment, the folding toothbrush is sold with toothpaste applied to the bristles and a

plastic cover that prevents the toothpaste from getting crushed. A sleeve can also be used to reinforce the joint and prevent the toothbrush from folding during use.

[0042] FIGURE 4 depicts an alternative embodiment of the present invention in which a foldable, disposable toothbrush 400 includes a detachable toothpick 402 and dental floss 404. Detachable toothpick 402 is formed from the same piece of sheet plastic as handle arm 110. Detachable toothpick 402 is partially cut away from handle arm 110, leaving at least one attachment point 406. In an alternative, more than one attachment point attaches detachable toothpick 406 to handle arm 110. The user detaches toothpick 402 completely for use.

[0043] The edges of detachable toothpick 402 can be cut according to conventional means during manufacture and can be used according to such cutting. In an alternative, the edges of detachable toothpick 402 can be rounded during manufacture using a friction- or heat-based smoothing means.

[0044] Because the toothbrush is manufactured from thin sheets of plastic, any edge of handle arm 110 can be used as a tongue scraper. Alternatively, a thin-edged tongue scraper can be manufactured into the handle.

[0045] Dental floss 404 is prestrung between two points of handle arm 110 so that the user can use the floss by inserting the handle arm 110 into the mouth. For embodiments with dental floss attached, handle arm 110 (or, alternative, both arms 108 and 110) can be narrowed to fit more comfortably into the mouth. The handle narrowing can be effectuated by the removal of detachable toothpick 402 as schematically depicted

in FIG. 4B. Alternatively, another detachable piece can be removed to narrow arm 110. In another embodiment, the entire toothbrush can be manufactured more narrow.

[0046] In a preferred embodiment, dental floss 404 is affixed to the handle by an adhesive. Alternatively, dental floss 404 can be heat-embedded into handle arm 110. In a preferred embodiment, the prestrung dental floss is approximately one-half to one inch long; it can be longer or shorter. In a preferred embodiment, dental floss 404 is a predetermined length and is not adjustable. In an alternative, toothbrush 400 includes reserve floss. Floss 404 can be used and a new length put into place. In that alternative, toothbrush 400 includes reserve floss and means to hold the floss in place. Small metal clips can be used to hold the floss in place. Dental floss 404 can be placed on any edge of the toothbrush arms.

[0047] The invention comprises many variations and adaptations, as will be apparent to those with skill in the art. Such embodiments are intended to fall within the scope of the invention, the scope of which is limited only by the following claims.